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A New Knowledge Society Index: Global Tendencies and an Analysis of Turkey

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Abstract
Numerous studies have examined the growth rate and the level of development of countries. According to economy, sociology, and even history, it can be easily observed that knowledge is one of the most important indicators for countries to achieve sustainable growth and development. Education is seen as the main input for a society to be considered a "knowledge society," and the aim of this study is to investigate this multidimensional character of education. In the scope of the study, United Nations Public Administration Network (UNPAN)'s Knowledge Society Index is reviewed and recalculated with respect to different variables to understand the significance of being a knowledge society for the economic g rowth of a country. Regarding this recalculation, another important aim of the study is to rank Turkey in the recalculated index and try to expose reasons for its actual situation. In this context, Turkey's strengths and weaknesses are set out. In conclusion, in accordance with the determinations, policy recommendations to authorities are also included.

Keywords: Knowledge society • Composite indicators • Knowledge economy • UNPAN Knowledge Society Index

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The notion of a knowledge society derives from the Latin word "informato" and is used in the meaning of "formation," "shaping," and "announcing." In general, knowledge is defined as an "intellectual product" or "something learned" that is acquired by thinking, judging, reasoning, reading, observing, and testing. Especially in the last two decades, considering the knowledge explosion that occurred due to the advances in science and technology and the opportunities that information technology has offered for societal and economıc improvements, it will be appropriate to mention Toffler's (1984) "third wave" stage as "the age of knowledge," and the society that this era requires as "knowledge society."

According to Toffler, "The ignorant of the future will not be the uneducated, but the person who doesn't know how to learn;" this clearly exposes the importance of knowing the ways and methods of learning (Boydak, 2001). These authors indicated that in the future knowledge will be the most distinctive factor in shaping the individuals and society. Toffler's saying "in the ancient times the strong, in the industry age the rich used to achieve, but in the age of knowledge the knowledgeable will achieve" indicates that in the forthcoming period the success of the individual, the institution, and the society depend on the efficiency in producing and using the knowledge (Simsek & Yildirim, 2001).

Literature

Knowledge economy has been a widely discussed notion in which knowledge plays a basic role in the level of economic and sociological development of countries. In the literature, science and education have been the basic elements associated with a knowledge-based economy (Hargreaves, 2002). The education phase has been analyzed in many studies in the literature, and some of these findings will be mentioned below (UNESCO, 2005).

The "knowledge society" and "knowledge economy" terms were first used by Drucker (1969). In a study in 2001, Drucker mentioned that knowledge will be the main element for economies. He has used the argument of the domination of knowledge workers within overall employment to explain why knowledge should be perceived as the primary element for economies. Friedman (2005), parallel to Drucker's ideas, explained the link between education and societal transformation by identifying innovation as the main element for the transformation of economies (Oblinger, 2012).

The Tertiary Education for the Knowledge Society report, prepared by the Organisation for Economic Cooperation and Development (OECD) for 14 countries included political proposals to create the greatest effect in shaping the labor market with regard to education, The proposals that are mentioned are: (*a*) the basic terms of the arrangements should be within the long-term plans and address the society and labor market in general; (*b*) reward education that meets the expectations of the labor market, thus fostering agreements that promote success; (*c*) define the existing organizational structure in a better way and conduct research on the success of decisions that are made; and (*d*) make education be supported financially not only by the general public but also by the financial institutions. Besides, the report emphasized the necessity of forming a professional career-planning center that will lead students to a specialized field and establishing national institutions in forming an education system consistent with the country's customs. It is also necessary that the education system be able to compete internationally. The report also stressed the importance of foreign language education through joint degree programs prepared with other countries and institutions, which should have international activity and mobility in terms of career-planning incentives. It emphasized that education should not be in an absolute theoretical form and, therefore, should not lack practical applications.

Knowledge-Based Economy has three main dimensions: production, distribution, and knowledge-information. Another description for knowledge-based economy was made by Powell and Snellman (2004) in which they identified (*i*) new science-based industries, (*ii*) knowledge-based labor for the new industries existing in the knowledge society, and (*iii*) learning and continuing innovation by firms (Sharma, Ng, Dharmawirya, & Samuel, 2010).

Volken (2002) was concerned about the importance of information and communication technologies on economic efficiency. He linked trust and innovative actions with efficiency. Trust contributes to transactions and, as a result, effects economic growth. According to some sociologists, information and communication technologies are the key indicators of societal change, while some researchers concentrated on the cultural preconditions of technological change. Nowadays in order to obtain economic growth, high rates of knowledge society should be obtained.

Draghici's (2006) study included a detailed assessment of the OECD report on the subject,

which was very important in terms of leading European Union (EU) candidate countries. Draghici underscored the importance of prioritizing policies that support innovation, encourage foreign capital, and create a powerful private sector, thus securing a balance between the public and private sectors. At this point, the public sector's most important role should be in maintaining an equality of opportunities by means of competition, investment, and trade and to set policies that will ensure economic growth (David & Foray, 2002).

Likewise, Girgis Amin (2006) adopted the concepts of knowledge management to higher education institutions in the Sudan. The author noted that a number of existing facilities, systems, or projects which contribute to knowledge management in higher education, such as libraries and electronic collections of learning materials, networks for e-mail communication, and management information systems which provide data on the student profile were linked to the creation of a knowledge environment in higher education. In the study, he investigated the opportunities when considering knowledge as an asset. A comparison between explicit and tacit knowledge was deeply discussed.

In Kaynak and Yaylalı's (2007) study, the authors used the variables and scales in the Knowledge Economy Index, developed by the World Bank, to do an analysis of knowledge economy performances by countries. According to their findings, Turkey had a poorer performance than most countries in education and human resources, according to global and regional scales, as well as in terms of income levels.

In Zgurovsky's (2007) study, sustainable ecological-social-economic development is crucial for the development of human capital. An approach of system coordination and balance of these three variables is important for a country to be identified as a knowledge society.

Zaman and Adrian (2008) discussed the competitiveness with knowledge-based economy for Romania in the period of 2006-2007. In the study, competitiveness in Romania was addressed with EU-25, EU 10, Bulgaria, and Turkey comparisons. The pillar-indices used in the comparison were: global competitiveness index, higher education and training, technological readiness, business sophistication, and innovation. The investigated countries were compared in terms of their competitiveness index indicators, which are efficiency and innovation factors. Innovation factor pillars which are calculated for measuring competitiveness are: institutions, infrastructure, macroeconomics, health and primary education, higher education and vocational training, market efficiency, technological readiness, business complexity, and innovation capacity. For every pillar, sub-pillars have been designated and countries and group of countries' rankings were compared. This study stated Romania's strengths and weaknesses in terms of the investigated factors which were very crucial for the study.

In his study Zamfir (2010) underlined the importance of improving students' skills for the knowledge society. According to the author, information and communication technology is one of the most important subjects for knowledge-based society and is a vital part of the relation between human capital, education, and growth. In this respect, he emphasized that teachers have a great role in improving the learning style toward a student-centered education rather than a teacher-centered one. The skills that the knowledge-based society requires from students are creative thinking, economic and social thinking, decision making, critical thinking, team task-solving, and communication.

Chandrasekar and Sharma (2010) tried to explain the impact of knowledge on economic activity. They concluded that in the case of long-term growth and improvement of a society, the disparity of knowledge within the society is crucial. The knowledge disparity within societies was assumed to be based on their capability to link knowledge to value creation.

According to Hilbert, López, and Vásquez (2010), the digital dimension was calculated by the diffusion of information and communication technology (ICT) equipment. The installed stock of ICT equipment in the consumer segment was multiplied by its technological performance. As a result, this calculation resulted in the "installed technological capacity" for storage (in bits), bandwidth (in bits per second), and computational power (in computations per second).

Nour (2011) investigated the importance (impact) of tacit and codified sources of knowledge at the micro and macro levels in Sudan using firm survey results (2010) at the micro level and secondary data at the macro level. According to his findings, there are positive correlations between knowledge and various variables at the micro and macro levels. At the macro level, tacit knowledge and codified sources of knowledge were positively and significantly correlated with both schooling years and GDP growth (economic growth rate). Since

tacit knowledge is often embodied in educated people, or human capital, the positive impact of tacit knowledge also implies the importance of a good education at the micro and macro levels.

Yigitcanlar (2011) linked the concept of knowledge with urban development as a promising paradigm to support the transformation process of cities into knowledge cities and their societies into knowledge societies. Additionally, he discussed the development of future cities by particularly highlighting potential challenges and opportunities that previously had not been fully considered.

Matei and Cristea (2011) examined the relationship between a knowledge society and knowledge-based economy. Education, science, security, and diversity were the focus of research in this study. The study assumed that if the necessary provisions are provided, then right steps will be taken for knowledge economy. In this study they defined a reflexive relation between scientific discovery and educational processes with education-sustaining scientific progress. Their paper also assumed a reflective relationship between cultural diversity and education. The authors pointed out that if a knowledge society is approached as a science society, then there will be serious differences between the developed and developing countries. Consequently, even if there will not be any inconveniences in reaching knowledge, there will be differences in usage among areas. While explaining the effects behind the scenes, the expenditure per researcher has been taken into account. Representing the expenditure, GDP, research budget allocations, number of researchers, and allocated value per researcher were examined. Thus, rise in public expenditure allocated to research knowledge plays a more important role. The authors emphasized that education should be reshaped in a way that it will help creativity as well as provide knowledge.

Maria's (2012) study of making proposals for the Romanian economy introduced a new model of innovation in the context of knowledge-based economy from a knowledge triangle of education, research, and innovation. This study asserted the importance of widening Porter's diamond cluster model (1990) as an innovation of Guth (2005). The new diamond is based on the individual and institutional learning concept.

Krasnokutskaya (2012) indicated the importance of the use of indicators and composite indexes of development of knowledge-based potential as a close source information. This study concentrated on identifying the gap between countries and regions. However, to examine the subject thoroughly, it is important to analyze according to differences that are particular to the area and not according to the general indicators.

Mircea-Iosif's (2013) study approached the subject of knowledge-based society in terms of enhancing knowledge that aims to raise the life standards. He examined the Innovation Union subject, which is involved in the 2020 target of EU, countries and stated the necessary dynamics.

UNPAN Index

The structure of global competition is changing day by day, and all countries are trying to increase their capacities in this highly competitive world. The manufacturing industries are using technology at a higher level whereas consumption trends are also shifting towards knowledge-based products apart from the traditional goods and services. In this new era, knowledge is the main input for countries to this new economy and the level of adaptation of a society to the above-mentioned information age will be the leverage to sustain the development process.

Regarding this fact, understanding the level of adaptation for countries to the information age, the Knowledge Society Index (KSI) was devised by UNPAN in 2004 and this study aimed to revise and review the UNPAN's previous KSI with the latest available data to understand the countries' level of engagement to this new world and to evaluate competitiveness, not only in terms of economy but at the level of societal adaptation.

The Index of Knowledge Societies (IKS) measures the performance that countries register in the three main dimensions: assets, foresightedness, and advancement. In this context, firstly, assets are determined by: the number of young and educated people (as measured by expected schooling and the segment of the population below age 15); and the flow of information through the improvement of mediums (as measured by the expansion of print media, the Internet, main phone lines, and cellular phones).

Secondly, advancement is graded by which member state nurtures and improves its people with its resources for information regarding the degree of public health spending, research and development expenditure, (low) military expenditure, pupil/teacher ratios in primary education, and a proxy of the "freedom from corruption" indicator.

Table 1
UNPAN Index

Final Index Dimensions	UNIKS		
	Assets	**Advancing**	**Foresightedness**
Underlying Indicators	*Years of Schooling	*R&D Expenditure	*Child Mortality
	*Young population	*Gov't. Health Expenditure	*GINI Index
	*Newspapers	*Military Expenditure	*Protected Areas
	*Internet users	*Pupil/teacher Ratio	*CO2 emissions
	*Phones & Cells	*Freedom from Corruption	

Lastly, foresightedness is measured by the growth and development of a Member State in becoming a knowledge society, in case of minimizing the effects of negative external factors on people and the natural environment, as measured by: low child mortality rates, equality in income distribution (GINI Index), protected areas as percentage of a country's surface, and CO2 emissions per capita.

At IKS, all calculations were done in an illustrative and experimental manner. While calculating the assets, advancement, and foresightedness dimensions, cultural attitudes and the creativity level in school, etc. were excluded because it is difficult to reach global data. However, the choices of variables to represent these dimensions were obtained by examining the correlation and regression analysis.

For the first step of calculation, IKS is an expression of each underlying indicator in a homogeneous and comparable basis due to the positive or negative impact on the knowledge society. To eliminate this situation, each indicator is expressed as a value between 0 and 1 by applying the below mentioned formula.

$$\text{Index Value} = \frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}} \quad (1)$$

In this formula, the country with the best performance will be marked with a value of one, whereas the country with the lower performance will have an index value of zero. All other countries will receive values due to their relative distance from the best to worse.

Since some indicators interpret differently due to IKS, a high value represents both a positive or negative outcome. High values of expected years of schooling, or research and development expenses have positive outcomes, whereas a high rate of emissions of CO2 or military expenditures express negative situations.

$$\text{Index Value} = 1 - \frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}} \quad (2)$$

In order to interpret the same value for all other indicators, the Index value was reversed. The formula (2) used to reflect these indicators has a value between 0 and 1.

In this approach, all indicators have the same meaning: the higher the value obtained by a country the better its performance in knowledge society.

An Index is calculated by the average of each dimension indices (Asset Index, Advancement Index, and Foresightedness Index) with standardized single indicators.

In case of illustrative and experimental basis of the calculation of Index, the combination of indices could be changed in the future with respect to the availability of relevant data. Besides, 45 countries were randomly chosen due to the availability of relevant data of each country's indicators.

Our "Knowledge Society Index"

UNPAN published the Knowledge Society Index in 2004 to understand the components of being a knowledge society and its importance in the global economic system. Our Knowledge Society Index is different from UNPAN's index by two dimensions. UNPAN's Index includes 45 countries from all over the world, including different income levels or economic structures which shows a heterogonous structure. Our index includes the OECD countries (limited with the data availability). We employed the data and the methodology to understand the differences among OECD countries. The second contribution is using the new data sets.

While these are the main contributions, our Knowledge Society Index is also based on the UNPAN's Knowledge Society Index (UNPAN, 2005) whereas there are minor differences in sample size of countries, data, and methodology of index calculation.

Data and Sample Countries

UNPAN's KSI considers a three sub-dimensional composite indicator to calculate the final index. Our KSI uses the same approach and the sub-indexes "Assets," "Advancing," and "Foresightedness" are used as the sub-dimensions. The data used in the UNPAN's Index are updated since it was calculated in 2005, and updated data are used to calculate our Index. Added to this updating, we also revised the "Assets" and "Advancement" sub-indices. We inserted the "Urban Population Ratio" to the calculation of the Assets Sub-Index and Government's Education Expenditures to the Advancing Sub-Index together with removing pupil/teacher ratio and military expenditures from calculation since the data has no statistical significance in the related literature.

The data and the sources used in the calculation of the Index are shown in Table 2 below.

Another important difference between UNPAN's Index and our recalculation is in regard to the sample countries. In its report, UNPAN (2005) mentioned that because of the data availability and coverage of countries for the indicators, they use a random selection of countries for calculation of the index. We use the OECD Countries and BRIC Countries' data in our calculation for two reasons. The main reason is in regard to the data availability for the OECD Countries. The second reason is due to the knowledge society phenomenon itself. The comparison among similar group countries is considered to be more efficient to identify the differences based on the data.

Although the data coverage is satisfying in most of the indicators, in some of them we would not be able to have the same year data for all the countries. In this case, we treat the missing data using the latest available data in the indicator within the same data source.

The list of countries in our Index Calculation is shown in Table 3.

Table 3
List of Countries in Our Index

Australia	Denmark	India	New Zealand	Spain
Austria	Estonia	Ireland	Norway	Sweden
Belgium	Finland	Israel	Poland	Switzerland
Brazil	France	Italy	Portugal	Turkey
Canada	Germany	Japan	Republic of Korea	UK
Chile	Greece	Luxembourg	Russia	USA
China	Hungary	Mexico	Slovakia	
Czech Republic	Iceland	Netherlands	Slovenia	

Method

We follow a similar methodology to UNPAN's index calculation but we also differentiate in some steps during the construction of our Index.

The factor tests are first applied to the data that we have in our index to understand if the dataset is appropriate for principal components analysis. Regarding the OECD Handbook on Constructing Composite Indicators (2005), the data was checked for outliers, linearity, and correlation coefficients. We have corrected the data set for outliers with the second-best option and checked for the Keiser-Meyer-Oklin (KMO) coefficients. The KMO measure of sampling adequacy is a statistic for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients. The concept is that the partial correlations should not be very large if

Table 2
Data and Sources

Indicator	Related Sub-Index	Data Source	Data Year
Expected Years of Schooling	Assets	UNESCO	2010
Young Population	Assets	World Bank	2012
Urban Population	Assets	World Bank	2012
Newspaper per 1000	Assets	UNPAN	2005
Internet Diffusion	Assets	World Bank	2012
Telephone Lines	Assets	World Bank	2012
R&D Expenditure	Advancing	World Bank	2012
Government Health Expenditure	Advancing	World Bank	2012
Government Education Expenditure	Advancing	World Bank	2012
Child Mortality	Foresightedness	World Bank	2011
GINI Coefficient	Foresightedness	OECD	2010
Protected Areas	Foresightedness	UNPAN	2005
CO2 Emissions	Foresightedness	World Bank	2009

Table 4
KMO and Bartlett Test Statistics Results

	Assets	Advancing	Foresightedness	Overall
KMO Test Statistics	0.75	0.58	0.68	0.65
Bartlett Test of Sphericity	Variables are not intercorrelated	Variables are not intercorrelated	Variables are not intercorrelated	Variables are not intercorrelated

distinct factors are expected to emerge from factor analysis (Hutcheson & Sofroniou, 1999).

The findings are shown in Table 4 below for each sub-dimension and for overall index calculation. KMO test statistics are all calculated over the critical value of 0.50, and the dataset was found to be appropriate for constructing the index. The only change in the sub-dimensions is the removal of military expenditure data from the dataset since we discovered that the KMO increases when we remove the data.

Both indices use the same normalization method –the min-max normalization and the normalized data is calculated;

$$\text{Index Value} = \frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}}$$

For the indicators which are considered to be a negative impact on the index scores, the index value is multiplied by -1 to reflect the impact. The objective is to take into account the data properties with respect to the measurement units in which the indicators are expressed and their robustness against possible outliers in the data (Ebert & Welsch, 2004).

In the first level, the calculation of sub-index scores for Assets, Advancing, and Foresightedness is similar with the UNPAN's Index methodology. All indicators were assigned an equal weight and the sub-index scores were calculated. After the sub-index scores were calculated, the multivariate analysis-- specifically Principal Components Analysis (PCA)-- was applied to determine the final index scores. The results of PCA are shown in Table 5.

Table 5
Principal Components Analysis

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	222.64	16.55	0.74	0.74
Comp2	0.57	0.36	0.19	0.93
Comp3	0.20		0.06	1.00

The result of PCA shows that the three sub-indexes can be represented in one principal component and the weights are 0.61 to the Assets Sub-Index, 0.60 to the Advancing Sub-Index, and 0.50 to the Foresightedness Sub-Index, which is also different from the equal-weighting approach from the UNPAN's Index. The final Knowledge Society Index scores are calculated by multiplying the normalized values of Sub-Index Scores and weights by PCA.

One should remember that the index scores themselves nor the rankings may not mean much. In order to makes comparisons between countries about knowledge society, we decided to cluster countries instead of evaluating individual scores and rankings. Regarding this decision, we applied cluster analysis to the sub-indices and final index.

Results and Discussion

The Knowledge Society Index is constructed with three sub-dimensions. The Assets Sub-Index defines a society's potential for knowledge diffusion and its flow of information with other countries. The Advancing Sub-Index defines a country's nurturing and improvement of its people with information resources. The Foresightedness Sub-Index is measured by the growth and development of a member state on its way of becoming a knowledge society in terms of minimizing the effects of negative external factors on its people. Regarding these three sub-indices, we find that the Assets and Advancement Sub-Indices and their indicators are more statistically significant in the index construction since they have more weights in the final index.

The sub-index rankings, as well as the final Index rankings, are reported in Table 6. Rather than providing specific scores for each country, they are simply categorized into five ranking groups. Considering the countries covered in the analysis, the results are not very surprising as more developed economies with relatively smaller populations, like Denmark, Switzerland, and Iceland are placed in the highest group. These countries are also among the best ranked countries of the Advancing and Foresightedness sub-indices and are in the second ranked group in the Assets sub-index. This result may basically be explained by the countries having greater economic welfare and opportunity to distribute it within the country; they will be able to lead the knowledge diffusion and this makes them better ranked knowledge societies. This finding is also confirmed by the worst rankings being occupied by developing countries with relatively

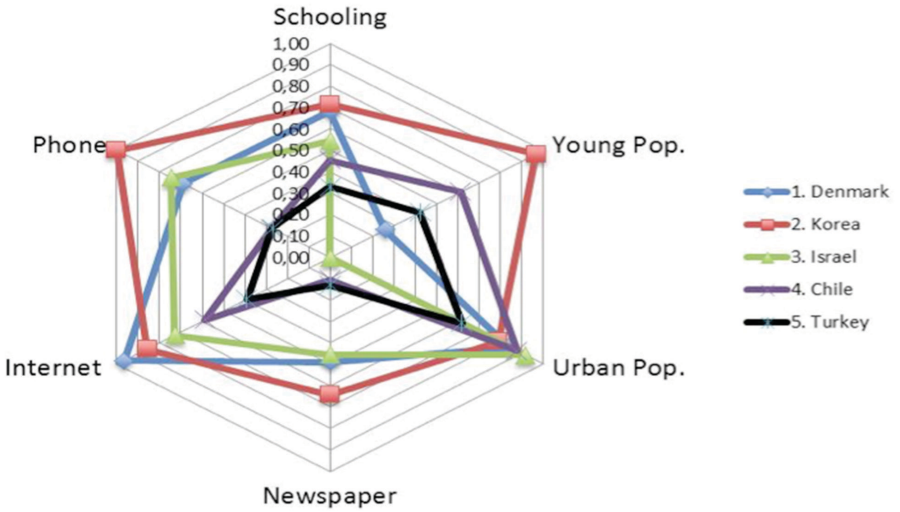

Figure 1: The Assets Sub-Index of selected countries.

higher populations, such as China, Brazil, Mexico, Turkey, Russia, and India. This result may also be surprising, on one hand, since India is a growing market using technology-based industries like the mobile and software industries, but not surprising on the other hand as the country has a relatively large population and it is difficult to diffuse the knowledge within the society.

Other countries, such as Germany and Korea, occupy the second group of index score rankings. This is also interesting that even smaller developed countries rank among the best performing countries while it is also possible for larger populated countries to be among the better rankings.

Turkey, with a relatively large population and a developing economy, shows a similar performance with other countries of similar characteristics. Turkey is placed in the fourth group in the Assets Sub-Index, in the fifth group in the Advancing Sub-Index, and in the fourth group in the Foresightedness Sub-Index.

Figure 1 compares Turkey's data levels with Chile, Denmark, Israel, and Korea (the fifth ranking

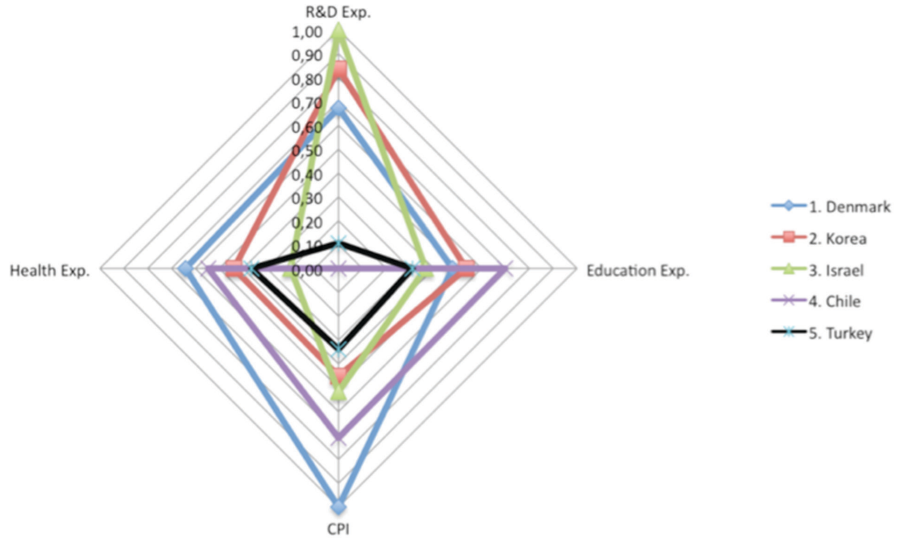

Figure 2: The Advancing Sub-Index of selected countries.

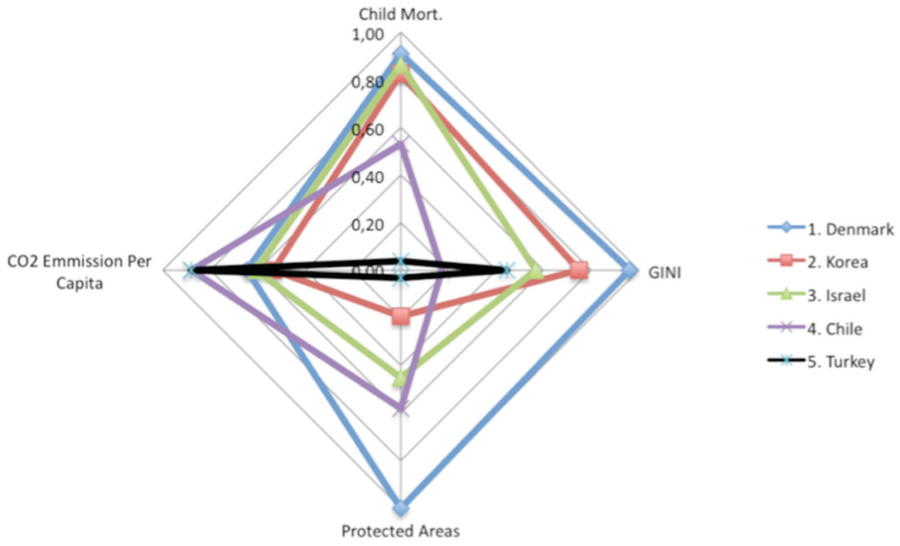

Figure 3: The Foresightedness Sub-Index of selected countries.

Table 6
Sub-Indexes and Final Index by Country in terms of Group Ranking

Assets	Cluster Ranking	Advancement	Cluster Ranking	Foresightedness	Cluster Ranking	Knowledge Society Index	Cluster Ranking
Denmark	2	Denmark	1	Denmark	1	Denmark	1
Switzerland	2	Switzerland	1	Switzerland	1	Switzerland	1
Iceland	1	Iceland	2	Iceland	2	Iceland	1
New Zealand	2	New Zealand	2	New Zealand	2	New Zealand	2
Sweden	2	Sweden	2	Sweden	1	Sweden	2
Germany	2	Germany	2	Germany	1	Germany	2
Norway	2	Norway	2	Norway	2	Norway	2
Rep. of Korea	1	Rep. of Korea	2	Rep. of Korea	3	Rep. of Korea	2
Netherlands	1	Netherlands	2	Netherlands	2	Netherlands	2
Austria	3	Austria	3	Austria	1	Austria	2
Finland	1	Finland	2	Finland	2	Finland	3
Australia	1	Australia	2	Australia	3	Australia	3
Japan	1	Japan	2	Japan	2	Japan	3
UK	1	UK	3	UK	2	UK	3
France	1	France	3	France	2	France	3
USA	1	USA	2	USA	3	USA	3
Canada	1	Canada	2	Canada	3	Canada	3
Luxembourg	1	Luxembourg	3	Luxembourg	3	Luxembourg	3
Belgium	1	Belgium	3	Belgium	2	Belgium	3
Israel	3	Israel	3	Israel	2	Israel	3
Slovenia	3	Slovenia	4	Slovenia	2	Slovenia	4
Ireland	3	Ireland	3	Ireland	3	Ireland	4
Estonia	3	Estonia	3	Estonia	2	Estonia	4
Spain	3	Spain	4	Spain	2	Spain	4
Czech Republic	3	Czech Republic	5	Czech Republic	2	Czech Republic	4
Chile	3	Chile	4	Chile	3	Chile	4
Slovakia	3	Slovakia	5	Slovakia	1	Slovakia	4
Portugal	3	Portugal	4	Portugal	2	Portugal	4
Hungary	3	Hungary	5	Hungary	2	Hungary	4
Poland	4	Poland	5	Poland	2	Poland	4
Italy	4	Italy	5	Italy	2	Italy	4
Greece	3	Greece	5	Greece	3	Greece	4
China	4	China	5	China	5	China	5
Brazil	4	Brazil	5	Brazil	4	Brazil	5
Mexico	4	Mexico	4	Mexico	4	Mexico	5
Turkey	4	Turkey	5	Turkey	4	Turkey	5
Russia	3	Russia	5	Russia	4	Russia	5
India	5	India	5	India	5	India	5

group). Turkey is in the lower-medium level in the Assets Index (4th group) and all other countries in the comparison are at better levels. Turkey is only performing better than Israel in schooling, has only a younger population than Denmark, reaches similar levels in urban population to other compared countries, and has a similar data level with Chile in newspapers per 1,000 people data. The phone and internet use data level performances are relatively underperforming with regard to the compared countries. Turkey's investment in communication infrastructure in the last decade needs to greatly improve to perform better in the Assets Sub-Index.

Figure 2 compares Turkey's data levels with the same countries in terms of the Advancing Sub-Index, which mainly measures the government's contribution. In this sub-index, the difference between better ranked countries and Turkey is widening. In Research and Development expenditures data, Israel, Denmark, and Korea rank far higher than Turkey, which is only performing better than Chile. The other data in the Advancing Sub-Index show that Turkey needs to invest more in health and education and perform better in the Corruption Perception Index to be ranked higher in this sub-index, which is statistically significant in the final index scores.

Figure 3 compares Turkey's data levels with the same countries in terms of the Foresightedness Sub-Index. In this sub-index Turkey needs to invest more in protected areas and in decreasing the CO2 emissions per capita while attaining a more balanced income distribution within the society.

Conclusion

In this research, we reviewed the UNPAN's Index of Knowledge Society constructed in 2005, created a new Knowledge Society Index, and compared Turkey's situation with that of other countries. Turkey is ranked in the worst group of countries in the overall index as a result of its performance in the sub-indices and indicators. In a globalized, knowledge-based world Turkey should further improve its infrastructure for communication technologies, invest more in health and education, perform better in the Corruption Perception Index, decrease CO2 emissions per capita, improve its income distribution within the society, and increase its protected areas to improve its position in the world. The index also shows that the developed economies are still dominating the knowledge-driven society and economy.

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